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ABSTRACT

A successful program of computer-assisted instruction (CAI) in composition will require collaboration between writing teachers and computer experts. Although programs can be carefully evaluated prior to their purchase, the effectiveness of a composition CAI program can be judged only after conducting empirical research with specific student populations, and until substantial research on the CAI program used in a writing program is conducted, instructors cannot know what its ultimate value will be. Such research must answer the following questions: (1) Does this CAI program guide students through the composing process? (2) Does it provide a useful supplement to classroom instruction? (3) Does it have an effect on students' writing attitudes? (4) Is the program more effective in teaching some rhetorical tasks than others? and (5) Will it encourage students to write more? Each school or university must develop its own set of test instruments to answer these questions. One college used four types of instruments for collecting evaluative data on its own CAI program--questionnaires for teachers and students; a survey of student attitudes with pretests and posttests and a control group; student narratives of their experiences with CAI; and a limited collection and an analysis of protocols comparing the composing processes of students who have used the CAI program with those who have not. (HTH)

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Computer-Assisted Instruction, Research, and the Writing Process: "Well, It Looks Good. But Can It . . .?"

A long time ago, in a galaxy far away, two bits bought a roll and a cup of coffee or a burger and a Coke. Now, we are told, two bits comprise two pieces of binary information; four bits are a nibble, and eight bits (the present cost of coffee?) are a byte. Today, we must deal in the currency of computer technology, in bits and bytes, RAM and ROM, k's and cores. It comes as no surprise, therefore, that professors of English, rhetoric, and composition feel apprehensive as they approach the tulgey wood of computer hardware and software.

Fortunately, the jargon of hardware can be translated by a computer salesperson or a friendly computer scientist. In addition, a variety of helpful publications exist to help assess the usefulness of particular hardware and such software as word processors, statistical packages and computer-assisted instruction (CAI) designed to teach style, grammar, mechanics, or spelling.[1] Unfortunately, very little software has been produced with the purpose of teaching the processes of writing.[2] Even less information is available on how teachers and departments can assess such software's effectiveness. In fact, it is as yet unclear whether computers can be used to teach the processes involved in writing.

This paper has two goals. First, we outline what, to us, are the essential requirements of any CAI program that purports to teach composing processes. Second, we offer a list of research questions that teachers should

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ask about such process-oriented software after they begin to employ it regularly in their classes.

What We Want the Computer to Do

The explosion of process-based research in composition during the last ten years has served to convince many English teachers that it is necessary to instruct beginning students in the entire process of composing--from planning to editing--if they are to become successful writers. An unwelcome, albeit expected, result of this heightened awareness of the writing process has been an increase in the number of people-hours most professionals devote to their composition classes. They, and we, have found that it takes much longer to work with a student through the lengthy prewriting, brainstorming, and planning strategies, multiple drafts and proofreading of a paper, than it does simply to examine a written product in its final form.

In their search for assistance, composition teachers have turned to writing labs, tutoring networks, and conferencing specialists. And yet, all of these solutions have an inherent limitation--they depend upon the hiring and training of additional personnel, an option that many colleges and universities simply cannot afford. As a result, many instructors of composition have begun to seek non-human sources of help and have found, in computers and computer-assisted instruction, a set of powerful greatest allies. Microcomputers, for example, have proved to be relatively inexpensive teaching tools that can, for certain tasks, accommodate more students than can the best teachers. Teachers have found that they can relegate the relatively simple job of helping students work on their grammar and usage to computers, realizing that such mechanical tasks can be easily adapted to binary logic. Thus, programs such as PLATO and Houghton Mifflin's Dolphin Language Series

are able to act effectively as electronic workbooks--teaching students how to use commas, avoid dangling modifiers, and to recognize the subject of a sentence. These programs free teachers for more difficult tasks in the composition classroom--lecturing, having conferences, or organizing small group work. But even so, teachers still have too much to do.

Despite the obvious benefits of computers, however, the great majority of English teachers lack sophisticated skills in programming and software design and, therefore, have been unable to create CAI that does more than present grammar and usage drills in an electronic workbook format. A few pioneers such as Hugh Burns of the United States Air Force Academy and Robert Bishop of The University of Michigan have been able to apply the computer to more complex matters of content and process.[3] Nevertheless, these remain isolated attempts, despite repeated claims of a "computer revolution" in our field.[4]

An obvious solution to the problem of our inability to capitalize on recent gains in software would be collaboration between teachers of composition and software programmers, a collaboration that just has not occurred to date. At this time, most computer-assisted instruction for composition is written by English teachers, who have only a limited grasp of the potentials inherent in programming and software design, or by technicians at computer companies with limited visions of modern composition theory and pedagogy. It is increasingly clear to us that a successful program of computer-assisted instruction will require collaboration between composition and computer experts. A corollary to this is that until such programs are piloted no research testing their usefulness will be possible.

Seven Questions To Ask the Salesperson Who Tries to Sell You CAI

If we reject the simplistic drill and practice CAI currently available, what will we substitute? Indeed, how much more can we expect from the new generation of software now being developed. What characteristics make software effective for teaching the processes involved in teaching composition?

For the past two years, at Michigan Technological University, we have been wrestling with these questions and designing our own CAI programs for freshman writing courses. In our struggle to understand what constitutes effective CAI for process-oriented composition programs, we have learned several important lessons, and we have become more critical consumers, both of the CAI currently on the market and the CAI that is now being developed for writing courses. In an effort to share those lessons, we offer, here, seven questions that potential users of CAI in composition need to ask before they buy software.

Question #1: Does this CAI address significant writing problems?

The first lesson we learned in trying to develop our own process-based software was that any CAI that was going to be useful in our composition program would have to address students' real writing problems, not simply their difficulties with spelling, grammar, and punctuation; we knew these surface-level aberrations were the very least of the writing problems our students demonstrated to us. The kind of CAI we wanted dealt with the infinitely more complex and more primary problems of purpose, audience, planning, organization, development, and logic.

Question #2: Does this CAI have a true process orientation?

Research completed over the last decade has convinced us that teachers must teach their students how to compose--offering them a variety of heuristics for inventing, focusing, planning, drafting, revising, and editing--if we hope to make them more successful writers. Any CAI we adopt must support this process approach, either by addressing one part of the composing process--as Hugh Burns has done with his invention programs [5]--and suggesting the remainder of the process, or by guiding students through the entire process.

Question #3: Is this program rhetorically specific?

As teachers of writing and as writers ourselves, we recognize that those strategies and techniques we employ when we are composing an informative essay are different from those we use when we are composing a persuasive address. According to such rhetoricians as James Kinneavy, these two tasks involve very different types of discourse.[6] For this reason, we believe that process-oriented CAI for the composition classroom should be both aim and mode specific. We want CAI to suggest to students that they may have different sets of concerns with--and, thus, may want to take different approaches to--writing an expressive narrative rather than an informative classification, for example.

Question #4: Will this CAI make students write?

Although this question derives from the most obvious lesson we learned as we developed software, it is the one most often ignored by the CAI currently marketed for English and composition classrooms. The basic

assumption of our composition program is that students learn to write by writing. Our students will become more successful writers, we believe, when they practice the techniques, strategies, and heuristics we teach them. They will find out for themselves what works and what doesn't when they write stories, memos, essays, journals, and reports. Beginning writers will not learn to write by identifying those sentences that employ commas correctly, an exercise which formed the basis for the last CAI program we examined.

Question #5: Does the program accomodate a range of writing skills and experiences?

Perhaps the first lesson that any writing teacher learns is that no two of her students compose in the same way, use the same repertoire of skills, or draw from the same set of experiences. To be of use to teachers, CAI must be flexible enough to handle the range of the writers who inhabit our composition classrooms. Any well-written program of CAI must store process-oriented composition instruction on several different levels and access higher or lower level explanations and practice exercises as they are needed by individual students.

Question #6: Did the development of this CAI involve specialists in both composition and software-design?

In creating our own CAI, we have learned that writing scripts for effective software--that is, the texts describing what the computer should say, how it should ask for responses, where it should branch to provide varying levels of instruction, and the content it should cover--requires training in rhetorical and pedagogical theory. We found, in other words, that it takes good teachers--familiar with current research, well versed in

theories of discourse and the writing process, and experienced in the teaching of composition--to write the beginnings of good software. We also found, however, that the best scripts are useless until they are translated by software-design specialists into efficient and accessable programs. The software-design specialists with whom we have worked tell us exactly what our Terak 8510/A microcomputers can and cannot do, advise us on the best programming languages and styles for the material we produce, divide our scripted texts into subroutines that our computer can handle as fast as students can type in text, and figure out how much material should be presented on each "screen" of the CAI modules we write. Neither we, as English teachers, nor the software-design specialists could do the job alone. Both kinds of expertise are needed to create CAI that will be a valuable supplement in the composition classroom.

Question #7: Has this CAI been field-tested?

Working with our own CAI provided us with a healthy dose of what we might call reality therapy. When we had finished writing our first CAI scripts and our software-design specialists had finished programming them, we thought they were finished. The first group of students we turned loose on the software showed us just how naive we were. They found ways to sabotage the programs that we hadn't even imagined. They muddied the waters of the simplest directions, chose alternatives that didn't appear on the screen, and wanted to quit in the middle of a thirty-minute program to grab a cup of coffee at the student union. This first field-test gave us a fresh perspective on our CAI and made it clear that we were in for multiple revisions. We now know that any software not thoroughly field-tested on the population for which it was designed is still in the first-draft stage.

Anyone who has attended national composition conventions or glanced through recent journals can tell that we are not suffering from a paucity of CAI programs. And yet, those of us who have used commercial CAI know that these programs have not been written to address the concerns of composition teachers or their students. Until we know what we want in CAI for the composition classroom, until we become informed consumers of software, we remain at the mercy of software development firms who know little about our field, our concerns, and our pedagogical approaches. Defining what we mean by effective software will also allow us to evaluate the CAI that is now being developed in academic settings and reported in the literature.

Using CAI for Composition Research

Although we can evaluate CAI programs before we purchase them to see how well they correlate with our general philosophy of composition and the rhetorical theory upon which we base this philosophy, their final effectiveness can only be judged after conducting empirical research with specific student populations. Evaluation of CAI must be an on-going process. Once a potential CAI user has struggled with the process of evaluating software and has decided upon purchasing or creating programs considered suitable for teaching writing, the door is opened for a wide variety of research. We can hardly be enthusiastic supporters of CAI in the composition classroom without a clear idea of exactly what effect such programs have had on our students' writing. Until we have completed substantial research on the CAI actually being used in our writing programs, we cannot know what its ultimate value will be. Eventually, we need to know answers to at least six major research questions about the CAI we employ. To find these answers we

must devise research plans that will allow us to gather data on the effects of particular CAI packages on our students.

Question # 1: Does this CAI guide students through the composing process?

A primary concern in our initial selection of CAI has to be its process orientation. Yet, even after we have selected or created such programs, we still will need to determine if the CAI we have chosen--or, indeed, if any CAI--can guide students successfully through the complexities of the composing process in a variety of rhetorical situations. Our research will have to consider whether or not the computer has inherent limitations that might render process-based composition programs too simplistic. An additional concern is the generalizability of the composing strategies the students learn from the CAI. Can students transfer knowledge of the composing process from the software exercises to the writing assignments they encounter in various classes?

Question # 2: Does this CAI provide a useful supplement to classroom instruction?

Classroom instruction in writing will remain the primary means by which students become aware of composition strategies. Therefore, it is especially important to know whether or not process-oriented software can provide an effective supplement to classroom instruction. Do students who have access to CAI that reinforces classroom activities learn more about writing, feel better about writing, or write better than students who have not had such reinforcement?

Question # 3: Does this CAI offer a viable alternative or complement to tutors?

More and more college and university writing laboratories are relying on tutorials that match an experienced professional (or in some cases, a classmate) with an inexperienced writer. Such tutorials offer one-to-one help with the writing process. Could such help be better offered by sophisticated, branching computer programs geared to meet students at their individual levels of competence? Is it possible that some students would prefer working with the computer and would show improvement equal to or better than that found with students who worked with a human tutor? To what extent can highly interactive computer software stand in for human interaction? We need several longitudinal studies of student populations who work with CAI and of comparable populations who do not.

Question # 4: Does this CAI have an effect on students' attitudes toward writing?

If the writing classes at MTU are indicative of writing classes elsewhere, then students' attitudes toward writing are a major obstacle to their becoming good writers. Many students find writing difficult and painful. Anything that would improve their feelings about the writing process itself is also likely to improve the product of their writing efforts. From our experiences at Michigan Tech, we have come to believe that working with CAI may have a positive effect on the attitudes of at least some students. They consider working on the software we've developed almost as much fun as playing video games, and, hence, they find writing less painful. Whether that is simply a function of the novelty of the experience or a lasting effect remains to be seen. The fact that students receive neat, hard copies of their

work at all stages and do not have to work with messy drafts may also result in a change of attitude about the revising process.

Question # 5: Is this CAI more effective in teaching some rhetorical tasks than others?

We have become increasingly aware of the fact that strategies and techniques employed by writers vary with the rhetorical task they face. If we are demanding that our CAI be designed specifically to treat these different forms of discourse separately, then we will need to examine whether or not the software can perform equally well in teaching a varied selection of rhetorical aims and modes.

Question # 6: Will this CAI encourage students to write more?

Central to the concept of process-based composition instruction is the idea that students must write in order to improve their writing. We need to know if a particular piece of CAI, even that which is carefully chosen for its emphasis on composing, causes students to write more often or to write more freely. First, we can ask if the CAI affects fluency at different points in the composing process. Does the CAI help students brainstorm more effectively on the cathode ray tube than they do on paper? Does an electronic journal work as effectively as a means of having students explore their thoughts about a particular issue, reading assignment, or paper? Are students willing to do more or deeper revisions on the computer than when working with paper copies? Second, we need to know if the CAI encourages fluency in certain types of writing more effectively than it does in others. Those of us who teach process-based composition encourage a variety of writing tasks--memos, letters, stories, journals, essays. Does the CAI we use succeed in getting students to write more, or more often, in certain rhetorical contexts?

Some Preliminary Suggestions about Evaluation Instruments

Because the student population, the frequency of use, and the instructional context in which the CAI is used will vary according to the educational setting, each school or university will have to develop its own set of test instruments to answer questions like the ones we have just posed. In working with our own CAI at Michigan Tech, we have settled upon a minimum of four types of instruments to use in collecting data and answering the questions above. First, we plan to administer a questionnaire--one version for teachers aand another for students--which will address the attitudes of both groups toward specific CAI programs we use. We will employ another survey to determine whether students who have used the CAI have experienced a change in their attitude toward writing in general. Administrations of these instruments will involve pre and post surveys and control groups who do not use the modules. Second, we plan to use writing samples--evaluated by means of primary trait scoring--which will be collected from students who have used the CAI modules and from a control group of students who have not used these modules. Third, we plan to ask a random selection of students to give retrospective narratives of their experiences with the CAI in an attempt to ascertain the flexibility of our modules in meeting individual needs and questions. Finally, a limited collection and analysis of protocols will be done to examine the comparative composing processes of students who have used the CAI modules and those who have not.

Some Final Comments

CAI may be the promise of the future. It may prove the cost-effective

answer to over-crowded classes in composition and to reduced personnel budgets. We know its use will inspire a number of research questions that educators have not yet begun to consider. The first project for those of us interested in process-oriented composition teaching is the creation of software meeting the criteria we set out here. We believe, based on our own experience, that such programs can be written. We should all be prepared, however, to examine critically the sudden proliferation of advertisements, brochures, and flyers promising process-based instruction which may soon stuff our mailboxes. Until such time, that's our 188,736 bits' worth.

Notes

1. See recent issues of Byte and Creative Computing for evaluations of a wide range of computer hardware. For a review of selected hardware appropriate for word processing uses in a language laboratory setting, see Max Fritzler's report, A Composition Program Looks at Computers: A Tentative Evaluation of the Software and Hardware Appropriate to a Word Processor Assisted Writing Program, written for the FIPSE Research Group Program in Composition at the University of Minnesota.

2. Cynthia L. Selfe and Billie J. Wahlstrom, "The Benevolent Beast: Computer-Assisted Instruction for the Teaching of Writing," The Writing Instructor, Summer 1983.

3. Hugh L. Burns and George H. Culp, "Stimulating Invention in English Composition Through Computer-Assisted Instruction," Educational Technology, August, 1980.

   Robert Bishop, "Adapting Computer-Assisted Instruction to the Non-Programmer," ED081231, (1973), 3.

4. William Wresch, "Computers in English Class: Finally Beyond Grammar and Spelling Drills," College English, 44(September 1982), 438-490.

5. Burns and Culp.

6. James L. Kinneavy, A Theory of Discourse (New York: W. W. Norton & Co., 1971).